Claims

1. Process for the for the production of precipitated silica from olivine,
characterised by the following steps:
   - providing olivine particles with a particle size preferably below 1 mm in diameter,
   - preferably mixing olivine and water to form an olivine/water slurry,
   - mixing the olivine/water slurry with hydrochloric acid (HCl), preferably at a concentration at 18 wt% or above, and at a temperature preferably between 50 – 130 ^{0}C, and reacting for a period of time, preferably between 20 – 360 minutes,
   - removal of coarse mineral impurities (sand product),
   - separation of precipitated silica from mother solution,
   - mechanical treatment of the separated precipitated silica and optionally some water to obtain a slurry.
   - preparation of a low viscosity slurry by adding sodium aluminate or another suitable aluminate, preferably to 100 – 6000 p.p.m., and adjusting the pH, preferably to values between 4 – 9
   - ageing at a temperature between 50 – 150 ^{0}C according to product requirements
   - dispersion of silica slurry
   - removal of fine mineral impurities (sand product)
   - drying of the silica

2. Process according to claim 1
characterised in that mechanical treatment of the separated precipitated silica, optional water addition, preparation of a low viscosity slurry by adding sodium aluminate or another suitable aluminate, preferably to 100 – 6000 p.p.m., and pH adjustment, preferably to values between 4 – 9 is carried out in one step.

3. Process according to claims 1 -2,
characterised in that the particle size of the olivine is in the range of between 0.020 and 0.350 mm in diameter.

4. Process according to claims 1 - 2,
characterised in that the temperature of the acid solution, when the adding of the acid is started, preferably is in the range of about 90-115°C

5. Process according to claims 1 - 2,
characterised in that the temperature of the olivine/acid slurry immediately after mixing olivine and acid is in the range of 90-110°C.

6. Process according to claims 1 – 2,
characterised in that the time for mixing olivine/water slurry and acid is between 0,5 and 5 minutes

7. Process according to claims 1 - 2
characterised in that the hydrochloric acid concentration is 18% at the start of the mixing with the olivine /water slurry, and additional concentrated HCl is added during the reaction time until sufficient amount is obtained.

8. Process according to claims 1- 2,
characterised in that the total reaction time is preferably in the range of 60 - 150 minutes.

9. Process according to claims 1 - 2,
characterised in that the removal of the coarse particles is accomplished by allowing the slurry to sediment in a sedimentation vessel

10. Process according to claims 1 - 2,
characterised in that the removal of the coarse particles is alternatively accomplished by means of hydrocyclone(s).

11. Process according to claims 1 - 2,
characterised in that the silica obtained after separation by filtration from the mother solution is washed with aqueous washing liquid (typically water) until suitably pure.

12. Process according to claim 11,

characterised in that the content of solid material in the filter cake after filtration is in the range of about 10-30%, or preferably in the range of 18-22%.

13. Process according to claims 1, 2 and 11,

characterised in that the resulting purified silica is subsequently and preferably mechanically treated, in e.g. a kneading device, to obtain a slurry with a high content of solid material.

14. Process according to claims 1 - 2,

characterised in that in the preparation of a low viscosity slurry is obtained by addition of sodium aluminate, or other suitable aluminates, to a concentration preferably in the range 300 to 3500 ppm., and that sulfuric acid, hydrochloric acid or another suitable acids is added for pH adjustment, obtaining a pH i preferably in the range of 5 –8.

15. Process according to claim 14,

characterised in that the content of solid material in the slurry is in the range of about 10-25%, or preferably in the range of 18-24%.

16. Process according to claims 1 - 2,

characterised in that the CTAB/BET ratio is increased to above 0.9 by ageing the silica slurry, in a stirred tank, preferably at a temperature of between 80 – 100 °C.

17. Process according to claims 1 and 14,

characterised in that the alumina content may be further increased after ageing by addition of sodium aluminate, or another suitable aluminate, and acid in an additional treatment step (9), and that this alternative route might require NaOH instead of acid in order to obtain the required pH (step 7 of claim 1).

18. Process according to claims 1 and 17,

characterised in that the pH of the substantially purified slurry is adjusted to a desired pH value, in the range of 6,5 to 7,0, prior to drying.

19. Silica product manufactured according to the process,
characterised by the following composition, in addition to silica (SiO_2); 0,005 – 0,7 wt% Na, 0,0035 – 0,35 wt% Al, 0,02 – 0,05 wt% Mg, 0,002 – 0,006 wt% Ca, 0,001 – 0,2 wt% S, 0,007 – 0,06 wt% Fe, up to 0,01 wt% Cl, 1 – 10 wt% H_2O, and with a pH between 4 – 9.

20. Silica product according to claim 19,
characterised in that the particle size is between 20 – 500 µm diameter, preferably between 50 – 250 µm.

21. Silica product according to claim 19,
characterised in that the CTAB number is between 100 – 200, preferably between 140 – 170.

22. Silica product according to claim 19,
characterised in that the BET number is between 50 – 500, preferably between 140 – 200.

23. Silica product according to claims 19, 21 and 22,
characterised in that the relation CTAB/BET is between 0,7 – 1,0, preferably between 0,9 – 1,0.

24. Application of the silica product according to the previous claims 19- 23 in rubber compounds, in particular rubber tires for vehicles.

25. Application of the silica product for absorbent carrier purposes such as in cattle and fish feeds.

26. Application of the silica product for thermal insulation purposes.